

## CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
1.08	3.8	9.4	1.5	8.0	1.2

SAFETY DATA SHEET SDS: B

## STANDARDS

- Europe: HS 2-9-1-8
- Germany: 1.3247
- France: AFNOR Z110DKCWV9.8.4.2.1
- Japan: JIS SKH59
- USA: AISI M42
- Sweden: SS2723
- UK: BM42

## DELIVERY HARDNESS

- Typical soft annealed hardness is 270 HB
- Cold drawn and cold rolled material is typically 10-40 HB harder

## DESCRIPTION

EM42 is a highly cobalt alloyed high speed steel to be used when the demand for hot hardness is of great importance. EM42 has a good machinability and a good wear resistance.

## APPLICATIONS

- Twist drills
- Milling cutters
- End mills
- Broaches
- Reamers
- Bandsaws

## FORM SUPPLIED

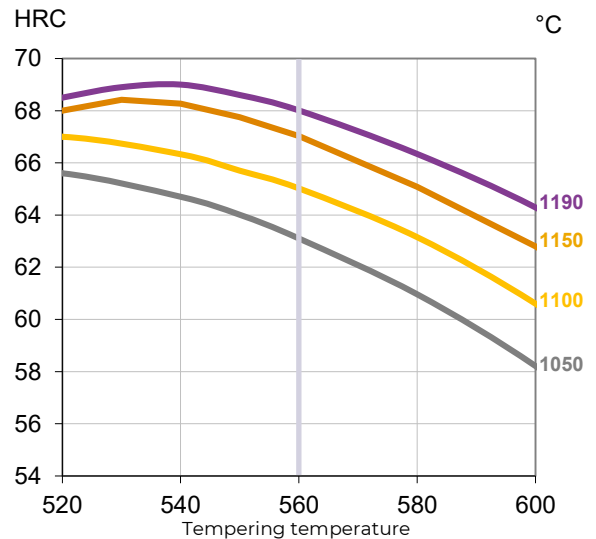
- Wire rod
- Drawn wire
- Round bars
- Flat bars
- Square bars
- Sheets
- Discs
- Bi-metal edge

Available surface conditions: drawn, ground, rolled, hot rolled, cold rolled, peeled, turned.

## HEAT TREATMENT

- Soft annealing in a protective atmosphere at 850-900°C for 3 hours, followed by slow cooling 10°C per hour down to 700°C, then air cooling.
- Stress-relieving at 600°C to 700°C for approximately 2 hours, slow cooling down to 500°C.
- Hardening in a protective atmosphere with preheating in 2 steps at 450-500°C and 850-900°C and austenitising at a temperature suitable for chosen working hardness.
- 3 tempers at 560°C are recommended with at least 1 hour holding time each time.

## GUIDELINES FOR HARDENING



Hardness after hardening, quenching and tempering 3x1 hour

Tool	Hardening	Tempering
Single-edge cutting tools	1190°C	560°C
Multi-edge cutting tools	1150-1180°C	550-570°C
Cold work tools	1050-1150°C	550-570°C

## PROCESSING

EM42 can be worked as follows:

- machining (grinding, turning, milling)
- polishing
- hot forming
- electrical discharge machining
- welding (special procedure including preheating and filler materials of base material composition).

## GRINDING

During grinding, local heating of the surface, which can alter the temper, must be avoided. Grinding wheel manufacturers can provide advice on the choice of grinding wheels.

## SURFACE TREATMENT

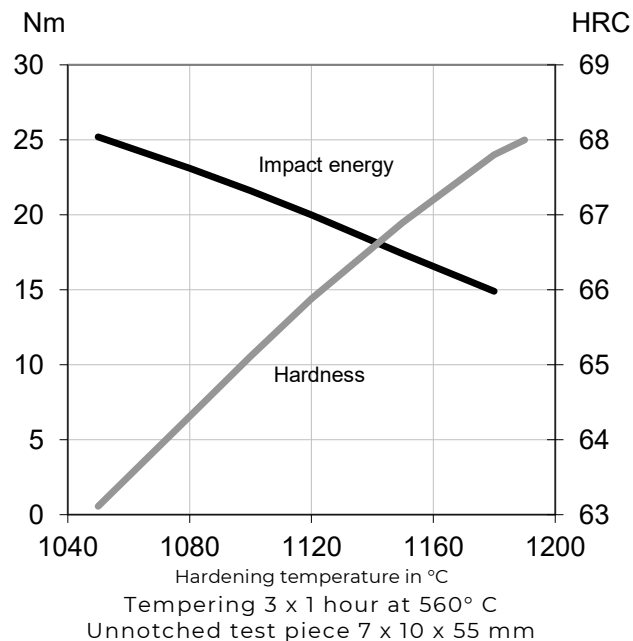
The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

**PROPERTIES**

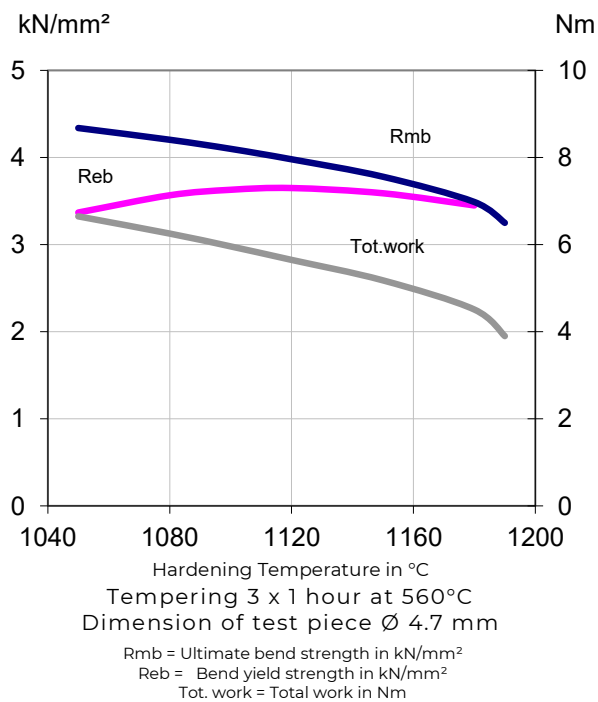
**PHYSICAL PROPERTIES**

Temperature	20°C	400°C	600°C
Density g/cm <sup>3</sup>	8.0	7.9	7.9
Modulus of elasticity kN/mm <sup>2</sup>	225	200	180
Thermal expansion ratio per °C	-	11.5x10 <sup>-6</sup>	11.8x10 <sup>-6</sup>
Thermal conductivity W/m°C	24	28	27
Specific heat J/kg °C	420	510	600

**IMPACT TOUGHNESS**



**4-POINT BEND STRENGTH**



**COMPARATIVE PROPERTIES**

